

AN INVESTIGATION OF ANOMALIES
AT ISTANBUL SECURITIES EXCHANGE:
SIZE AND E/P EFFECTS

A THESIS

Submitted to the Faculty of Management
and the Graduate School of Business Administration
of Bilkent University
In Partial Fulfillment of the Requirements
For the Degree of
Master of Business Administration

By

HAKAN CİVELEKOĞLU

July, 1993

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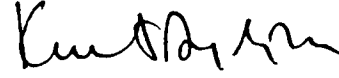
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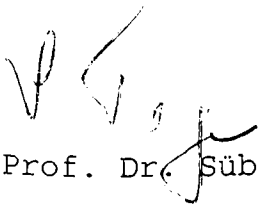
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ABSTRACT

AN INVESTIGATION OF ANOMALIES
AT ISTANBUL SECURITIES EXCHANGE:
SIZE AND E/P EFFECTS

HAKAN CİVELEKOĞLU

M.B.A. in Management

Supervisor: Assoc. Prof. Kürşat Aydoğan

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This study investigates the presence of 'size-effect' and 'E/P effect' at Istanbul Securities Exchange for the period January 1990-December 1992.

24 months of monthly return data prior to test year are used to estimate the market risk of each stock. Each year, portfolios are formed according to the previous year's E/P ratio and market value and then the average monthly returns of the current year are compared. In addition, to determine which of the variables significantly explain the average return of stocks, cross-sectional regression approach of Fama-MacBeth (1973) is applied.

The results reveal that there exists a weak 'E/P effect' in the years 1991 and 1992. However, a significant 'size effect' is not encountered at ISE as opposed to the case in developed capital markets.

Keywords: Market efficiency, E/P effect, size effect, anomaly

ÖZET

İSTANBUL MENKUL KIYMETLER BORSASINDA BİR ANOMALİ ARAŞTIRMASI: FİRMA BÜYÜKLÜĞÜ VE K/F ETKİSİ

HAKAN CİVELEKOĞLU

Yüksek Lisans Tezi, İşletme Enstitüsü

Tez Yöneticisi: Doç. Dr. Kürşat Aydoğan

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Bu çalışma İstanbul Menkul Kıymetler Borsasında firma büyüklüğü etkisi ve kazanç/fiyat (K/F) oranı etkisi olup olmadığını Ocak 1990 - Aralık 1992 döneminde araştırmaktadır.

Ele alınan dönemde her sene için, o seneden önceki 24 aylık getiri miktarları çalışmaya dahil edilen her hisse senedinin pazar riskini hesaplamak için kullanılmıştır. Her sene, hisse senetleri bir önceki senenin firma büyüklüğü ve K/F oranı değerlerine göre sıralanarak portföyler oluşturulmuş ve portföylerin o seneki aylık getirileri mukayese edilmiştir. Bundan başka, hangi değişkenlerin hisse senedi getirilerini istatistiksel olarak açıkladığını tespit etmek için Fama-MacBeth'in kesit regresyonu metodu tatbik edilmiştir.

Sonuçlar 1991 ve 1992 senelerinde zayıf bir K/F oranı etkisi tespit etmiştir. Bununla beraber, gelişmiş sermaye piyasalarında rastlanan firma büyüklüğü etkisi IMKB de rastlanmamıştır.

Anahtar Kelimeler: Pazar etkinliği, piyasa değeri etkisi, kazanç/fiyat (K/F) oranı etkisi, anomali

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I. INTRODUCTION

According to market efficiency hypothesis, security prices reflect all relevant information in an efficient market. A vast amount of research has been conducted on market efficiency tests in capital markets. Research on market efficiency has been divided into three categories; weak-form tests, semi-strong-form tests and strong-form tests. Instead of weak-form tests which are traditionally concerned with only the forecast power of past returns, this category has been recently covering the more general area of tests of return predictability (Fama (1991)).

Due to joint hypothesis problem, market efficiency per se is not testable. It must be tested jointly with some model of equilibrium, an asset pricing model. This statement suggest that we can only test whether information is properly reflected in the context of the equilibrium pricing model (Fama (1970)). Since market efficiency and equilibrium- pricing issues are inseparable, the concept of predictability also considers the cross-sectional predictability of returns, that is, tests of asset pricing models and the anomalies discovered in the tests.

Among the other asset-pricing models, model of Sharpe (1964), Lintner (1965) and Black (1972) has substantial effect on how academics and practitioners think about average returns and risk. Recent studies indicate several empirical contradictions of the Sharpe-Lintner-Black (SLB) model such as size effect, dividends/price (D/P) ratio effect, leverage effect, book/market value (B/M) effect and finally earnings/price (E/P) ratio effect. Among the other types of anomalies, *size effect* and *E/P effect* are of particular interest among the researchers. Size effect refers to average returns of stocks with low market value are substantially higher than that of the stocks with high market value and E/P effect refers to stocks with high E/P ratio outperform the ones with lower E/P ratio.

In an efficient market, if SLB model is correct, we do not expect E/P or size to explain the variation in cross-sectional returns. Only systematic risk, measured by the β coefficient should be able to explain the returns.

Although there has been considerable amount of studies about the presence of weak and semi-strong form efficiency at Istanbul Securities Exchange, there has been no published research about the cross-sectional predictability of returns with an asset pricing model and the anomalies.

The aim of this study is to jointly test the market efficiency with an asset pricing model by investigating the presence of a size effect and E/P effect anomalies at Istanbul Securities Exchange for the period January 1990-December 1992.

The rest of this thesis proceeds in the following manner. In Chapter 2, a review of literature about market efficiency and the empirical studies on 'anomalies' is presented. In Chapter 3, empirical studies about the efficiency at ISE are reviewed. In Chapter 4, the data used in this study are explained and the methodology to be followed is discussed. In chapters 5 and 6, I present my findings and conclude with a summary of the model and the results.

II.MARKET EFFICIENCY AND THE PREVIOUS EMPIRICAL WORK:

Market efficiency hypothesis was discussed by Fama in his well-known 1970 article. As Fama (1970) pointed out, a market at which security prices fully reflect all available information is called efficient. Fama suggested that market efficiency can be divided into three categories: the "weak form", the "semi-strong form" and the "strong form".

In a weakly efficient market present prices reflect all information contained in the record of past prices, that is, investors cannot consistently earn abnormal returns by observing the past prices.

In a semistrongly efficient market, prices reflect all available information, that is, security prices adjust rapidly and correctly to the announcement of all publicly available information.

In a strongly efficient market, present prices reflect all information , both privately held and insider information together with publicly available information.

Jensen (1978) suggests a weaker and economically more sensible version of the efficient market hypothesis: prices reflect information to the point where the marginal benefits of acting on information to

make profits do not exceed the marginal costs. The extreme version of the market efficiency hypothesis is false because there are surely information and trading costs.

Although there is ambiguity about information and trading costs, the joint hypothesis problem is more serious obstacle to inferences about market efficiency. Hence, market efficiency per se is not testable. It must be tested jointly with a model of equilibrium, an asset pricing model. According to the 1970 review (Fama (1970)), what can be only tested is whether information is properly reflected in prices in the context of an asset pricing model. As a result, if an anomalous evidence is found on the behavior of security returns, it is ambiguous that market is inefficient or the model of equilibrium, the asset pricing model is bad (Fama (1991)).

Early research on weak-form efficiency only concerns with the forecast power of past returns. However for the last decade, researchers have been interested in the area of *tests for return predictability* which also includes the work on forecasting returns with variables like dividend yield, earnings/price ratios (E/P), and term structure variables. Because efficiency of markets and equilibrium pricing issues can not be separated, the discussion of predictability also considers the cross-

sectional predictability of returns, that is, tests of asset pricing models and the anomalies discovered in the tests (Fama (1991)).

The central prediction of the asset pricing model of Sharpe(1964), Lintner(1965), and Black(1972) is that the market portfolio of invested wealth is mean-variance efficient in the sense of Markowitz(1959). Market portfolio's efficiency implies that (a) there is a simple linear relationship between the expected returns on securities and their β (the slope in the regression of a security's return on the market return), and (b) market β s are sufficient to describe the cross-section of expected returns.

There are several empirical contradictions of the Sharpe-Lintner-Black (SLB) model. Recent evidence suggests the existence of additional factors which are relevant for asset pricing.

Black, Jensen and Scholes (1972) and Fama and MacBeth (1973) find that, there is a positive simple relationship between average stock returns and β during pre-1969 period as predicted by the SLB model. However, Reinganum (1981a), Lakonishok and Shapiro (1986) and Fama and French (1992) find that the relation between average returns and β disappears during the 1963-1990 period, even when β is used to explain the average returns.

Bhandari (1988) finds that there is a positive relation between leverage and average return. It is plausible that leverage is associated with risk and expected return, but Bhandari finds that leverage helps explain the cross-section of average stock returns in tests that include size as well as β .

Stattman (1980) and Rosenberg , Reid and Lanstein (1985) find that average returns on US stocks are positively related to the ratio of a firm's book value of common equity, BE, to its market value, ME. Chan Hamao and Lakonishok (1991) find that book-to-market equity , BE/ME is also significant in explaining the cross-section of average returns on Japanese stocks.

Fama and French (1988) use D/P to forecast returns on the value-weighted and equally weighted portfolios of NYSE stocks from 1 month to 5 years. They find that D/P explains small fractions of monthly and quarterly return variances. However, fractions of variance explained grow with the return horizon and are around 25% for 2 to 4 year returns.

DeBondt and Thaler (1985-1987) find that the NYSE stocks identified as the most extreme losers over a 3- to 5- year period tend to have strong returns relative to the market during the following years, especially in January of the following years. On the contrary, the stocks that are extreme winners tend to have weak returns relative to the market in subsequent years.

According to them, these results are due to market overreaction to extreme bad or good news about firms.

Zarowin (1989) finds no evidence for the DeBondt-Thaler hypothesis that the winner-loser results are because of overreaction to extreme changes in earnings. He argues that the winner loser effect is related to the size effect of Banz (1981).

Banz uses a methodology similar to Fama and MacBeth (1973) and finds a negative association between the market value of the stocks and the average returns of the stocks. The t-statistic whether the "size effect" coefficient equals zero is -2.54 for the 1936-75 period and it is -1.88 and -1.91 for the 1936-55, and 1956-75 periods respectively.

Reinganum (1981) finds " After controlling returns for any E/P effect, a strong firm size effect still emerged. But, after controlling returns for any market value effect, a separate E/P effect was not found". Hence, Reinganum's conclusion is that "size effect" subsumes the evidence of Basu (1977), who finds that stocks with high earnings/price (E/P) ratios have higher risk adjusted returns than that of with low E/P ratios.

Several papers have analyzed the statistical tests of Banz (1981) and Reinganum (1981). In particular, Roll (1981) says that the stocks of the small firms are traded less frequently than the stocks of large firms

leading estimates of systematic risk from daily stock returns will be biased downward. Both Roll (1981) and Reinganum (1982), however, find that the bias in risk estimates due to non-synchronous trading cannot explain the magnitude of the risk-adjusted average returns found by Reinganum (1981).

Christie and Hertz (1981) argue that the "size effect" could be present because of non-stationarity in the risk measures. The risk of the stock of a levered firm increases as the stock value decreases.

Chan and Chen (1988) make use of a model that uses long time periods to estimate the unconditional portfolio β 's. The authors find that, after controlling for the betas thus estimated, a firm size proxy, such as the logarithm of the firm size, does not have explanatory power for the averaged returns across the size-ranked portfolios. They also find that when portfolios are formed on size, the estimated β 's of the portfolios are almost perfectly correlated with the average size of stocks in the portfolios.

Chan and Chen (1991) find that a small firm portfolio contains a large proportion of marginal firms-firms with low production efficiency and high financial leverage. They construct two size -matched return indices designed to observe the return behavior of marginal firms and find that these return indices are important in explaining the time-series return

difference between small and large firms. They argue that relative distress is an added risk factor in returns, not captured by β , that is priced in expected returns.

The study made by Stoll and Whaley (1983) demonstrates that total market value of common stock equity varies inversely with risk-adjusted returns and finds that transaction costs at least partially account for the abnormality.

Keim (1983) examines in his study, month-by-month, the empirical relation between abnormal returns and market value of NYSE and AMEX common stocks. He finds that the relation between abnormal returns and size is always negative and more pronounced in January than in any other months.

Chan, Hamao and Lakonishok (1991) and Fama and French (1991) find that size and book-to-market equity are related. Bad times cause many stocks to become small, in terms of market value, and so to have high book-to-market ratios. Fama and French also find that leverage and book-to-market equity are highly correlated.

Basu (1983) re-examines Reinganum's (1981b) results using a different sample period and a different procedure for creating portfolios of stocks ranked on both size and earnings/price ratios. Basu also uses a procedure to control for risk and concludes that the

stocks of low market value are riskier than that of high market value.

In one of his tests, Basu sorts stocks into portfolios with different E/P ratios but similar market value and concludes that high E/P stocks earn statistically significant positive risk-adjusted returns. On the other hand, when he sorts the stocks into portfolios with different market value but similar E/P ratios, no significant risk-adjusted returns are found for 1963-80 period. Thus, results of Basu contradicts the conclusion of Reinganum (1981b) that the "size effect" subsumes the "E/P effect". Basu also notes that there is some interaction between size and E/P ratios in the sense that the magnitude of the risk adjusted returns is largest for small firms with high E/P ratios. Basu's conclusion is that the "E/P effect" and the "size effect" probably are an indication of a bad capital asset pricing model, not a sign of market inefficiency.

Ball (1978) argues that E/P is a catch-all proxy for omitted factors in asset pricing tests. Thus, if two stocks having the same earnings but different risks, the riskier stock has a higher expected return, and it is likely to have a lower price and higher E/P.

Campbell and Schiller (1988) find that especially when past earnings (E) are averaged over 10-30 years,

E/P ratios have reliable forecast power also increasing with the return horizon.

The relations between expected returns and size, book-to-market equity, E/P, D/P and leverage are usually interpreted as confusions about the Capital Asset Pricing Model, or the way it is tested (wrong estimates of β) rather than as an evidence for market inefficiency. The reason is that expected return effects persist (Fama (1991)).

III. EMPIRICAL TESTS OF MARKET EFFICIENCY- THE CASE FOR TURKEY

A. Empirical Tests on Weak-Form Efficiency

Alparslan (1989) carried out a study in which the weak-form efficiency tests were applied to Istanbul Securities Exchange (ISE) first common stock market's adjusted price data. He used statistical tests of independence (autocorrelation and run tests) and tests of trading rules (filter rules) in these tests.

Runs and autocorrelation tests could not reject the weak-form efficiency. However, the results of the filter tests shows that for some stocks the market could have been beaten by an investor. Because of the large differences between the buy and hold filter returns, Alparslan demonstrates that the market is inefficient in the weak sense. However, it is useful here to notice that the results of Alparslan belongs to a period when ISE was very young.

Basci (1989) carried out a study which investigates distributional and time series behavior of common stock returns at ISE for the period 1986-1988. He finds that published past price information cannot be used to obtain better forecasts of future prices. This observation is parallel with the random walk

behavior, that is the weak form efficiency. However, the test of variance-time function indicate significant long term dependence for most stocks which is against the weak-form efficiency hypothesis. The comments for the study of Alparslan is applicable to the study of Basci as well.

Ünal (1992) uses daily adjusted closing prices of twenty major stocks for the period 1986-1991. He tests independence (serial correlation analysis), randomness (Runs analysis), distribution of daily prices (Test of normality). He also tests whether some mechanical trading rules (filtering) consistently and significantly profitable over a buy-and-hold policy by trade rules tests. All his results are against weak-form efficiency at ISE.

B. Empirical Tests on Semistrong-Form Efficiency

In the study carried out by Çadirci (1990), market adjustment to the release of stock dividend/rights offering information for the stocks listed at ISE first market for the period 1986-1989 is investigated.

She analyses the adjustment of security prices in the context of a market model that takes market related factors into account.

The results of her study demonstrates that the adjustment process is slow and positive cumulative abnormal returns are observed after the event date.

Consequently, she rejects the market efficiency in semi-strong sense at ISE.

IV. DATA AND METHODOLOGY:

A. Data

The data used in this study consist of the monthly returns of the stocks quoted at the Istanbul Securities Exchange (ISE) with their earnings/price ratios and market values over the period January 1988 to December 1992. The data to be used in this study are chosen by the following condition: At the beginning of each year T ($T=1990\dots1992$) all stocks with 36 consecutive monthly returns starting 24 months before and ending 12 months after the beginning of year T are used as the test data.

In order to satisfy this condition, not all stocks listed on ISE can be used. For the tests in 1990, while total number of stocks traded during the year is 114 , 40 of them satisfy this condition. For the year 1990, 49 stocks out of 142 , and for the year 1991, 67 stocks out of 152 satisfy the condition.

Market Value (which can also be referred to as 'size') of a stock for the year T is computed as price times the total number of shares outstanding of the stock as of the last trading day of the year T .

Earnings/price ratio (E/P) for the year T is computed as the net earnings per share for year T

divided by the price of the stock at the last trading day of the year T. This ratio can also be calculated as the total net earnings of the stock divided by its total market value.

The data of monthly returns, total earnings for year T and the total market value as of the last trading day of the year T of all stocks are obtained from the monthly bulletins of ISE.

For monthly 'risk-free rate' , monthly returns of the treasury bonds with three months of maturity are used. This data is taken from the monthly bulletins of Central Bank of Turkey.

B. Methodology

1. Calculation of β s:

For the calculation of β coefficients for individual stocks, the 24 months of data prior to T are used to estimate the market model regression,

$$R_{jt} - R_{ft} = \alpha_{jT} + \beta_{jT}(R_{mt} - R_{ft}) + \varepsilon_{jt},$$

$$t=T-24, \dots, T-1 \quad (1)$$

where

R_{jt} = Return on stock j in month t

R_{mt} = Return on equally weighted 'market' portfolio in month t

R_{ft} = Return on 'risk free' asset in month t;

measured as monthly return of quarterly treasury bonds.

β_{jT} = Stock j's relative risk for year T

(estimated OLS slope)

α_{jT} = Differential or abnormal return for stock j

2. Tests of 'size-effect' and 'E/P effect' by comparing appropriate portfolios

The methodology applied in this section of the study is similar to the procedures that Basu (1983) and Reinganum (1981) employ in their studies.

For each year T (T=1990...1992), the computed E/P ratios for year T-1 are sorted in ascending order. The distribution of annual E/P ratios are then divided into quintiles and each stock is assigned to one of five E/P portfolios, that is, lowest quintile to portfolio EP1, next lowest to portfolio EP2 and so forth. As such portfolio EP1 contains the stocks with lowest E/P ratios, whereas EP5 contains the stocks with highest E/P ratios.

These sorting and portfolio formation procedures are repeated but in this instance for the market values of the common stocks to form five market value (size) portfolios. The firms that have the lowest market value are included in MV1 and that with the highest market value are assigned to MV5.

The procedures used to form portfolios on the basis of E/P ratios and market values are repeated each year from 1990 to 1992. Therefore, the compositions of the portfolios change every year.

Unfortunately the number of stocks in each of these portfolios (the minimum is 8 for year 1990 and the maximum is 14 for year 1992 per portfolio) is not adequate to make meaningful statistical inferences from these data. Therefore portfolios EP1 and EP2 are combined to form the low E/P portfolio EP_{low} and portfolios EP4 and EP5 are combined to form the high E/P portfolio EP_{high}. Similarly, portfolios MV1 and MV2 are combined to form low market value portfolio MV_{low} and portfolios MV4 and MV5 are combined to form high market value portfolio MV_{high}. Portfolios EP3 and MV3 are discarded from the test.

With this data, the null hypothesis that whether there exists a difference in average returns between high and low 'E/P' portfolios and between high and low 'size' portfolios is tested with a t-test. In addition, whether the abnormal returns of the portfolios formed are different than zero or not is also tested with a t-test. Abnormal return can be defined as the difference between average monthly return of a portfolio formed based on E/P or market value and average monthly return of the equally weighted market portfolio.

3. Tests of 'size-effect' and 'E/P effect' by Cross-sectional Regressions:

Asset-pricing test conducted in this section of the study use the cross-sectional regression approach of Fama and MacBeth (1973). A linear relationship of the form,

$$E(R_i) = \gamma_0 + \gamma_1\beta_i + \gamma_2[(MV_i - MV_m)/MV_m] + \gamma_3(EP_i) \quad (2)$$

is assumed, where

$E(R_i)$ = expected return on stock i ,

γ_0 = expected return on zero-beta portfolio,

γ_1 = expected market risk premium,

MV_i = market value of stock i ,

MV_m = average market value,

E/P_i = earnings-price ratio of stock i ,

γ_2 = constant measuring the contribution of MV_i to the expected return of a stock, and

γ_3 = constant measuring the contribution of EP_i to the expected return of a stock.

Since expectations are not observable, the parameters in (2) must be estimated from historical data.

To generate minimum variance portfolios with mean returns γ_i , $i=0, \dots, 3$, a constrained optimization procedure is used (Fama (1976, ch. 9)). As shown by

Fama, this constrained optimization can be performed by running a cross-sectional regression of the form

$$R_{it} = \gamma_{0t} + \gamma_{1t}\beta_{it} + \gamma_{2t}[(MV_{it}-MV_{mt})/MV_{mt}] + \gamma_{3t}(EP_{it}) + \varepsilon_{it}, \quad i=1, \dots, N$$

on a period-by-period basis.

Accordingly, each month, the cross-section of returns on stocks are regressed on the stock β , market value and E/P ratio which are hypothesized to explain the expected returns. At the beginning of each year T ($T=1990 \dots 1992$), the hypothesized factors β , market value and E/P ratios are updated. As in the previous test, β is the slope of the regression line of the most recent 24 months time series monthly return data of each stock on the monthly return data of equally weighted market portfolio. In addition, for each year T , E/P ratio is the ratio of earnings per share to price of the stock and market value is the price times the number of shares outstanding as of the last trading day of year $T-1$.

For each month between January 1990 and December 1992, the time series mean of the monthly regression slopes then provides standard Fama-MacBeth tests of which explanatory variables, namely β , size and E/P ratio, on average have non-zero expected premiums during the January 1990 to December 1992 period. For this purpose, null hypothesis that mean of the time

series regression coefficient (γ) is zero is tested for each γ_i $i=1,2,3$.

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V. FINDINGS

A. Summary Statistics about Data

Not all stocks traded at ISE are used in tests. As described in the data and methodology chapter, for a stock to be taken in the sample, it should have 36 consecutive monthly returns starting 24 months before and ending 12 months after the beginning of year T (T=1990,1991,1992). Number of securities that satisfy this condition is 40 for the year 1990. This number is 49 and 67 for the years 1991 and 1992 respectively.

For each stock in the sample, descriptive statistics about their monthly returns are given in Appendix 1. They consist of mean, standard deviation, median, minimum and maximum of the monthly returns for each stock. In 1990, mean of monthly returns is 6.02%. Minimum return is realized as -41.2% for Erdemir and maximum is observed as 244% for the same stock. In 1991, mean of monthly returns is 5.5%. Minimum return is -73.6% (Deva Holding) and maximum return is 152.9% (Metas). In 1992, mean of monthly returns is 5.1%. Minimum monthly return is -56.9% (Pinar Un) and maximum monthly return is 103.7% (Kepez Elektrik).

Results of the regressions for each test year T (T=1990...1992) to determine the market risk of each security are presented in Appendix 2. The data used for

the computations consist of 24 monthly returns of stocks before the year T, adjusted for any stock-split, rights offering and dividend payments. Appendix 2 includes α and β coefficients together with R squared values, F values and their t-statistics. Among the stocks included in the test for 1990, average β coefficient is 1.04 with the average regression R^2 value of 0.60. In 1991, average β is 1.04 with average R^2 value of 0.56. These numbers are 1.04 and 0.53 for β and R^2 values respectively in 1992. We would expect average β coefficient as 1.00, however, the above result (average β is 1.04 for all years) is because, while computing market risk of the stocks, the monthly returns of the stocks are regressed on equally weighted market portfolio that also includes the stocks not used in the tests conducted.

All the t-ratios for β coefficients are found to be significant. t-ratios for α coefficients are found to be insignificant revealing that the stocks are neither underpriced nor overpriced. Furthermore, the calculated F values are greater than the critical F value indicating that the regression is significant.

R squared values are between 0.12 and 0.86 in 1990 and between 0.16-0.83 and 0.07-0.83 for the years 1991 and 1992.

B. Results of t-tests based on portfolio formation method

In each test year T ($T=1990\dots1992$), ten portfolios ($MV_1\dots MV_5$ and $EP_1\dots EP_5$) are formed based on market value and E/P ratio of stocks as described in the methodology section. Summary statistics about those portfolios are presented in Table 1. They include the average β coefficients, market values and E/P ratios for the year $T-1$ and the average monthly returns for the year T .

Minimum number of stocks in the portfolios are 8 (in year 1990) and the maximum number is 14 (in year 1992). These numbers are quite inadequate for making statistical inferences about any 'size effect' or 'E/P effect' if present. Therefore, in each test year portfolios $MV_{low}-MV_{high}$ and $EP_{low}-EP_{high}$ are formed as described in the methodology section. Table 2 shows some statistics about those portfolios for the each test year T ($T=1990\dots1992$). They include average β s, average monthly returns for year T , average E/P ratio and market value for the years $T-1$. t-statistics indicating of whether the mean returns of the portfolios $MV_{low}-MV_{high}$ and $EP_{low}-EP_{high}$ are equal or not and the t-statistics showing whether the abnormal returns of the portfolios (average monthly portfolio return minus average return on equally weighted market

SUMMARY STATISTICS OF E/P AND MARKET VALUE QUINTILES

1990

SORTED ON MV	Earnings (Million TL)	Market value (Million TL)	E/P Ratio	β	Average Return
MV1	2,047.1	32,798.4	0.054	0.986	0.056
MV2	4,946.7	97,456.9	0.050	0.874	0.049
MV3	11,746.1	158,084.3	0.079	1.190	0.043
MV4	18,268.9	283,746.7	0.065	1.097	0.031
MV5	130,378.1	1,213,507.1	0.097	0.979	0.134

SORTED ON E/P	Earnings (Million TL)	Market value (Million TL)	E/P Ratio	β	Average Return
EP1	1,135.2	194,790.5	-0.012	1.014	0.060
EP2	7,866.4	144,229.7	0.052	1.070	0.040
EP3	16,040.4	207,585.0	0.077	1.020	0.050
EP4	42,187.8	447,174.5	0.093	0.964	0.078
EP5	100,157.2	791,813.6	0.135	1.058	0.086

TABLE 1A

SUMMARY STATISTICS OF E/P AND MARKET VALUE QUINTILES

1991

SORTED ON MV	Earnings (Million TL)	Market Value (Million TL)	E/P	β	Average Return
MV1	(1,683.9)	29,486.0	-0.043	0.976	0.029
MV2	5,189.9	86,290.0	0.049	1.008	0.041
MV3	6,600.7	156,548.2	0.035	1.006	0.096
MV4	22,346.0	299,283.9	0.075	0.981	0.077
MV5	152,989.7	1,783,296.7	0.101	1.215	0.038

SORTED ON E/P	Earnings (Million TL)	Market Value (Million TL)	E/P	β	Average Return
EP1	(7,267.7)	321,875.1	-0.178	1.089	0.033
EP2	39,437.4	905,274.4	0.042	1.093	0.026
EP3	24,687.4	334,921.0	0.068	0.967	0.056
EP4	18,764.5	167,822.8	0.110	0.927	0.069
EP5	111,629.4	642,848.8	0.179	1.106	0.094

TABLE 1B

SUMMARY STATISTICS OF E/P AND MARKET VALUE QUINTILES

1992

SORTED ON MV	Earnings (Million TL)	Market Value (Million TL)	E/P	β	Average Return
MV1	2,134.9	19,198.2	0.032	1.114	0.006
MV2	3,212.2	56,432.4	0.113	1.048	0.009
MV3	23,903.1	191,953.1	0.121	0.959	-0.007
MV4	59,827.2	482,799.2	0.136	0.931	0.004
MV5	206,875.6	1,693,877.8	0.101	1.149	0.013

SORTED ON E/P	Earnings (Million TL)	Market Value (Million TL)	E/P	β	Average Return
EP1	(6,539.9)	161,529.1	-0.245	1.006	-0.009
EP2	20,817.2	491,781.2	0.042	1.007	-0.015
EP3	63,926.5	778,109.8	0.081	0.933	0.018
EP4	50,714.6	433,519.2	0.116	1.218	0.034
EP5	170,500.1	648,766.2	0.499	1.052	-0.000

TABLE 1C

portfolio) are different from zero or not are presented in Table 2. Comparison of the market risks (β s) of the high and low market value and E/P ratio portfolios with t-statistics are also given in Table 2.

Examining these results, it can be concluded that the mean β s of high and low market value portfolios are not different from each other. The same conclusion is also applicable to high and low E/P portfolios.

Other t-statistics suggest that there is no 'size effect' for the stocks traded at ISE, that is the stocks with low market value do not outperform the stocks with high market value. However, for years 1991 and 1992 there exists a significant 'E/P effect', that is the stocks with high E/P ratio outperform the stocks with low E/P ratio. In 1991, high E/P stocks earned average monthly return of 8.2% while the average monthly return of low E/P stocks was only 2.6%. In 1992, average return of low E/P stocks was -1.2%, while high E/P stocks earned an average monthly return of 1.6%. t-statistics for testing whether the mean returns of high and low E/P ratio portfolios equal are -2.93 and -2.14 for the years 1991 and 1992 respectively and they are significant within 95% confidence interval.

Average abnormal return data reveals that in 1991, high E/P stocks earned average monthly abnormal return of 3.5% while this number is only -1.8% for high E/P

COMPARISON OF HIGH AND LOW MARKET VALUE- E/P RATIO PORTFOLIOS

1990

SORTED ON MV	Earnings (Million TL)	Market value (Million TL)	E/P	β	Average Return	Average Abnormal Return	t-stat
LOWMV	3,496.9	65,127.6	0.0520	0.9297	0.0527	-0.02	-2.37
HIGHMV	74,323.5	748,626.9	0.0809	1.0381	0.0824	0.00	0.01
			t = (-1.09)		t = (-1.20)		

SORTED ON E/P	Earnings (Million TL)	Market Value (Million TL)	E/P	β	Average Return	Average Abnormal Return	t-stat
LOWEP	4,500.8	169,510.1	0.0203	1.0418	0.0498	-0.03	-2.31
HIGHEP	71,172.5	619,494.0	0.1138	1.0110	0.0818	-0.00	-0.01
			t = (0.29)		t = (-1.33)		

TABLE 2A

Note:

t-statistics for β and average return of portfolios are for the null hypothesis that mean β and return of high and low market value-E/P ratio portfolios are equal.

t-statistics for average excess return of portfolios are for the null hypothesis that mean excess return of the portfolios are zero.

COMPARISON OF HIGH AND LOW MARKET VALUE- E/P RATIO PORTFOLIOS

1991

SORTED ON MV	Earnings (Million TL)	Market Value (Million TL)	β	E/P	Average Return	Average Abnormal Return	t-test
LOWMV	5,189.9	86,290.0	1.008	0.049	0.041	-0.011	-1.04
HIGHMV	87,667.9	1,041,290.3	1.098	0.088	0.058	0.011	0.84
			t = (-0.88)		t = (-1.32)		

SORTED ON E/P	Earnings (Million TL)	Market Value (Million TL)	β	E/P	Average Return	Average Abnormal Return	t-test
LOWEP	39,437.4	905,274.4	1.093	0.042	0.026	-0.018	-1.39
HIGHEP	65,196.9	405,335.8	1.016	0.144	0.082	0.035	2.76
			t = (0.64)		t = (-2.93)		

TABLE 2B

Note:

t-statistics for β and average return of portfolios are for the null hypothesis that mean β and return of high and low market value-E/P ratio portfolios are equal.

t-statistics for average excess return of portfolios are for the null hypothesis that mean excess return of the portfolios are zero.

COMPARISON OF HIGH AND LOW MARKET VALUE- E/P RATIO PORTFOLIOS

1992

SORTED ON MV	Earnings (Million TL)	Market Value (Million TL)	E/P	β	Average Return	Average Abnormal Return	t-stat
LOWMV	2,653.6	37,125.8	0.071	1.082	0.007	-0.009	-1.14
HIGHMV	136,074.6	1,110,765.9	0.118	1.044	0.009	-0.007	-0.84
				$t = (0.24)$	$t = (-0.011)$		

SORTED ON E/P	Earnings (Million TL)	Market Value (Million TL)	E/P	β	Average Return	Average Abnormal Return	t-stat
LOWEP	6,632.0	320,539.3	-0.107	1.006	-0.012	-0.003	-2.94
HIGHEP	112,825.6	545,128.7	0.314	1.132	0.016	0.000	0.03
				$t = (-0.80)$	$t = (-2.14)$		

TABLE 2C

Note:

t-statistics for β and average return of portfolios are for the null hypothesis that mean β and return of high and low market value-E/P ratio portfolios are equal.

t-statistics for average excess return of portfolios are for the null hypothesis that mean excess return of the portfolios are zero.

stocks. In 1992, average abnormal monthly return of high E/P and low E/P portfolios are 0% and -2.8% respectively. t-statistics testing the null hypothesis that abnormal returns for low and high E/P ratio portfolios (EP_{low} and EP_{high}) equal zero in 1991 are -1.39 and 2.76 respectively. These numbers are -2.94 and 0.03 for the corresponding low and high portfolios of 1992.

C. Results of t-tests based on Cross-sectional Regressions Method

For each month of test year T ($T=1990....1992$), cross-section of monthly stock returns are regressed on β , size and E/P ratios as described in the methodology section. β , market value and E/P ratio data for each stock are updated every year.

Average slopes of each monthly cross-sectional regressions with R^2 value of the regressions are presented in Appendix 3. Mean of each monthly Fama-MacBeth coefficients (γ_s) together with their t-statistics testing whether they are equal to zero or not are presented in Table 3. Diagnostic checks are performed and no non-constancy of error terms are observed. The results reveal that none of the variables, β , market value or E/P ratio, are found to be significant.

RESULTS OF CROSS-SECTIONAL REGRESSIONS

	MEAN	STANDARD DEVIATION	T-VALUE
γ_1 (β)	-0.0036	0.0928	-0.2300
γ_2 (MV)	0.0053	0.0320	1.000
γ_3 (E/P)	0.0166	0.4978	0.2000

TABLE 3

On the other hand, while making inferences from the results of this approach, one should keep in mind some important shortcomings of this approach. Due to insufficiency of the number of stocks, individual stocks are used in this test rather than portfolios which, in fact, give better results. (Fama and French (1992)). Therefore, R^2 values are quite low in each monthly cross-sectional regression.

A major shortcoming of using Fama-MacBeth approach is that this approach assumes that the coefficients estimated every period are drawn from a stationary distribution. Changes over time in the levels of the explanatory variables will invalidate this assumption. Another point is that estimated β s rather than true β s are used in the cross-sectional regressions.

It is important to notice that even β is found to be insignificant. For this reason, the findings of this approach do not match with earlier findings of Fama and MacBeth (1973) and Black, Jensen and Scholes (1972). On the other hand, it is consistent with more recent studies of Fama and French (1992), and Lakonishok and Shapiro.

VI. CONCLUSIONS

The existence of size effect and E/P effect is investigated for common stocks traded in Istanbul Stock Exchange for the period January 1990-December 1992. Two different methods are implemented for this purpose.

First method makes use of a comparison of the average return and other characteristics of portfolios of common stocks based on their market value and earnings/price ratios. Due to insufficient number of stocks that meet the criteria to be included in the test sample in each year, only two portfolios EP_{low} and EP_{high} are formed each year where EP_{low} consists of low E/P ratio stocks and EP_{high} consist of high E/P ratio stocks. This procedure is repeated for the market value variable and accordingly, MV_{low} and MV_{high} are formed. The average returns of these portfolios are compared in each year from 1990 to 1992 and the null hypothesis of the mean difference in returns is zero is tested.

The findings of the comparison of portfolios with different E/P ratio and market value shows no evidence for the presence of a size effect at ISE, however, in years 1991 and 1992 a significant E/P effect is observed. That is, the average monthly return of the portfolio composed of stocks with high E/P ratio is

substantially higher than that of the portfolio with low E/P ratio stocks.

The second method implemented is the procedure of Fama-MacBeth (1973) applied to the stocks for the same period. Each month from January 1990 to December 1992, monthly stock returns are regressed on the hypothesized variables of estimated β s, market value and E/P ratio of the common stocks. Then, the average of the slopes of these regressions form a time series data that indicates which variables are significant in explaining the average monthly returns of the common stocks.

As opposed to the findings of the first method applied, the results of the application of Fama-MacBeth procedure reveals that non of the variables (β , market value and E/P ratio) are significant in explaining the average monthly returns of the common stocks.

Comparing these two results, it is difficult to reject the hypothesis that there is no E/P effect at ISE by simply taking into account the results of tests by cross-sectional regressions. It is important to notice here that most previous tests use portfolios while estimating betas of individual stocks because estimates of market betas are more precise for portfolios (Fama and French 1992). Unfortunately, this procedure cannot be applied to tests conducted in this study due to insufficient number of stocks to be tested each year. Therefore, R^2 values of each monthly cross-

sectional regression turned out to be quite small. Even β cannot explain the monthly returns of the stocks according to the findings of the second method.

Hence, it can be concluded that there exists a weak E/P effect on the average monthly returns of common stocks traded at ISE.

In addition to possible errors in estimating the market risks of individual stocks due to reasons explained above, it is ambiguous that this evidence of such an E/P effect found is a sign of market inefficiency at ISE or a bad model of equilibrium due to joint-hypothesis problem.

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MONTHLY STOCK RETURN STATISTICS

1990

	average return	standard deviation	median	minimum	maximum
1 AKCIMENTO	0.048	0.190	0.031	-0.244	0.511
2 ANADOLU CAM	0.008	0.200	-0.070	-0.127	0.591
3 ARCELİK	0.062	0.225	-0.048	-0.205	0.480
4 BAGFAS	0.072	0.279	-0.026	-0.281	0.677
5 BOLU CIMENTO	0.074	0.294	0.036	-0.311	0.738
6 BRISA	0.020	0.226	0.006	-0.266	0.594
7 ÇELİK HALAT	0.032	0.282	-0.060	-0.206	0.804
8 CİMSA	0.019	0.190	-0.016	-0.219	0.478
9 ÇUKUROVA ELEKTRİK	0.045	0.241	-0.009	-0.218	0.767
10 DOKTAS	0.056	0.231	0.077	-0.387	0.413
11 ECZ. YATIRIM	0.164	0.510	0.000	-0.345	1.685
12 EGE BİRACILIK	0.099	0.269	0.011	-0.300	0.613
13 EGE GÜBRE	0.065	0.407	0.018	-0.340	1.114
14 EREĞLİ DEMİR ÇELİK	0.150	0.735	0.000	-0.412	2.440
15 GOOD YEAR	0.019	0.303	-0.021	-0.306	0.814
16 GÜBRE FABRİKALARI	0.035	0.376	-0.105	-0.250	1.000
17 GÜNEY BİRACILIK	0.050	0.154	0.022	-0.149	0.337
18 HEKTAS	0.024	0.198	0.009	-0.274	0.541
19 İZMİR DEMİR ÇELİK	-0.054	0.222	-0.047	-0.367	0.455
20 İZOCAM	0.045	0.237	0.006	-0.290	0.605
21 KARTONSAN	0.027	0.211	-0.022	-0.167	0.644
22 KAV	-0.002	0.222	-0.057	-0.339	0.378
23 KEPEZ ELEKTRİK	0.146	0.497	-0.014	-0.180	1.652
24 KOC HOLDİNG	0.201	0.514	0.050	-0.325	1.591
25 KOC YATIRIM	0.100	0.208	0.112	-0.217	0.482
26 KORDSA	-0.006	0.185	-0.057	-0.184	0.471
27 KORUMA TARIM	-0.017	0.259	-0.105	-0.273	0.538
28 METAS	0.049	0.517	-0.085	-0.340	1.636
29 NASAS	0.100	0.729	-0.157	-0.339	2.263
30 OLMUKSA	-0.006	0.212	-0.074	-0.286	0.419
31 OTOSAN	0.038	0.264	0.009	-0.408	0.487
32 PINAR SUT	-0.003	0.224	-0.005	-0.300	0.567
33 PİMAS	0.070	0.362	-0.028	-0.400	0.775
34 SARKUYSAN	0.024	0.179	0.009	-0.169	0.313
35 T. DEMİRDOKUM	0.075	0.316	-0.017	-0.286	0.836
36 TİB	0.125	0.309	0.083	-0.308	0.789
37 TİC	0.179	0.387	0.093	-0.274	1.040
38 T. SIEMENS	0.055	0.322	-0.032	-0.338	0.732
39 T. SİSE CAM	0.196	0.523	0.054	-0.351	1.650
40 YASAS	0.029	0.282	-0.044	-0.211	0.853

APPENDIX 1A

MONTHLY STOCK RETURN STATISTICS

1991

	average return	standard deviation	median	minimum	maximum
1 AKCIMENTO	0.064	0.276	0.009	-0.221	0.617
2 ANADOLU CAM(ACS)	-0.049	0.196	-0.077	-0.325	0.286
3 ARCELİK	0.135	0.256	0.078	-0.172	0.660
4 BAGFAS	0.008	0.219	-0.018	-0.397	0.333
5 BOLU CIMENTO	0.051	0.342	-0.032	-0.392	0.909
6 BRISA	0.002	0.171	0.011	-0.210	0.255
7 ÇELİK HALAT	0.027	0.283	-0.030	-0.250	0.736
8 CİMSA	0.082	0.257	0.009	-0.269	0.489
9 ÇUKUROVA ELEKTRİK	0.024	0.273	-0.059	-0.288	0.467
10 DOKTAS	0.164	0.481	0.127	-0.680	1.298
11 ECZACIBASI YAT.	0.123	0.365	-0.011	-0.327	1.023
12 EGE GÜBRE	-0.017	0.155	-0.014	-0.278	0.238
13 EREĞLİ DEMİR ÇELİK	0.068	0.299	-0.036	-0.247	0.746
14 GOOD-YEAR	0.127	0.391	0.086	-0.218	1.303
15 GÜBRE FABRİKALARI	0.010	0.182	0.015	-0.262	0.333
16 GÜNEY BİRACILIK	0.148	0.349	0.093	-0.381	0.882
17 HEKTAS	0.011	0.262	-0.017	-0.365	0.598
18 İZMİR DEMİR ÇELİK	0.137	0.474	-0.003	-0.286	1.333
19 İZOCAM	0.156	0.310	0.155	-0.217	0.655
20 KARTONSAN	0.027	0.148	0.016	-0.179	0.310
21 KAV	0.067	0.310	0.002	-0.320	0.831
22 KEPEZ ELEKTRİK	-0.014	0.200	-0.024	-0.307	0.316
23 KOC HOLDİNG	0.064	0.204	0.031	-0.158	0.489
24 KOC YATIRIM	0.098	0.272	0.013	-0.184	0.619
25 KORDSA	0.063	0.155	0.062	-0.200	0.333
26 KORUMA TARIM	0.064	0.260	-0.015	-0.292	0.566
27 KOYTAS	0.067	0.280	0.076	-0.375	0.426
28 MAKİNA TAKİM	-0.036	0.289	-0.131	-0.333	0.712
29 MARET	0.118	0.300	0.047	-0.250	0.714
30 MENSUCAT SANTRAL	0.055	0.358	-0.047	-0.273	1.000
31 METAS	0.112	0.506	-0.049	-0.275	1.529
32 NASAS	-0.025	0.185	-0.080	-0.278	0.294
33 OLMUKSA	-0.021	0.134	-0.045	-0.298	0.208
34 OTOSAN	0.125	0.395	0.013	-0.338	0.885
35 PINAR SUT	0.019	0.242	-0.033	-0.308	0.447
36 PİMAS	-0.001	0.257	-0.044	-0.324	0.500
37 RABAK	0.039	0.284	0.012	-0.352	0.514
38 SARKUYSAN	0.107	0.313	0.047	-0.317	0.667
39 TELETAS	0.131	0.241	0.097	-0.306	0.578
40 T.DEMİR DOKUM	0.172	0.376	0.144	-0.292	1.069
41 T.İS BANKASI(B)	0.012	0.297	-0.095	-0.296	0.528
42 T.SİMENS	0.104	0.336	0.016	-0.286	0.850
43 T.SİSE CAM	-0.047	0.185	-0.020	-0.275	0.410
44 YAPI KREDİ	-0.014	0.149	-0.009	-0.254	0.206
45 YASAS	0.041	0.227	-0.037	-0.242	0.536
46 DEVA HOLDİNG	0.038	0.376	0.045	-0.736	0.840
47 PINAR ET	0.022	0.165	-0.041	-0.154	0.360
48 MARMARIS A.YUNUS	0.030	0.166	0.047	-0.250	0.310
49 PINAR SU	0.032	0.220	-0.044	-0.258	0.444

APPENDIX 1B

MONTHLY STOCK RETURN STATISTICS

1992

	average return	standard deviation	median	minimum	maximum
1 AKAL TEKSTIL	0.1621	0.3044	0.1317	-0.2174	0.7073
2 AKCIMENTO	0.0232	0.2109	0.0504	-0.3051	0.5345
3 AKSA	0.0588	0.2035	0.0418	-0.2000	0.4244
4 ALARKO HOLDING	0.0162	0.2892	-0.0286	-0.4356	0.5762
5 ANADOLU CAM	0.0639	0.3158	-0.0132	-0.2963	0.8571
6 ARCELİK	-0.0038	0.1730	-0.0367	-0.2409	0.4030
7 AYGAZ	-0.0122	0.1435	-0.0276	-0.2078	0.2941
8 BAGFAS	-0.0315	0.1493	-0.0238	-0.2667	0.2400
9 BOLU CIMENTO	-0.0300	0.2024	0.0000	-0.3503	0.3671
10 BRISA	0.0288	0.2129	0.0147	-0.3793	0.3182
11 CANAKKALE CIMENTO	0.0908	0.2549	0.0600	-0.1935	0.6136
12 CELİK HALAT	0.0290	0.1925	0.0074	-0.2575	0.4468
13 CİMSA	-0.0057	0.0591	-0.0182	-0.1222	0.0811
14 ÇUKUROVA ELEKTRİK	0.0565	0.1603	0.0362	-0.1921	0.4426
15 DEVA HOLDING	-0.0503	0.1953	-0.0615	-0.3705	0.2857
16 DOĞUSAN	-0.0272	0.2051	-0.0575	-0.3269	0.4444
17 DOKTAS	-0.0036	0.2014	-0.0639	-0.3236	0.2794
18 ECZACIBASI YAT.	-0.0460	0.1918	-0.0807	-0.3711	0.2016
19 EGE ENDÜSTRİ	0.0412	0.2129	0.0635	-0.2528	0.3756
20 EGE GÜBRE	0.0357	0.2285	-0.0238	-0.2286	0.5500
21 ERCİYES BİRACILIK	0.0925	0.1860	0.1116	-0.1915	0.4247
22 EREĞLİ DEMİR ÇELİK	-0.0289	0.1726	-0.0513	-0.2736	0.4030
23 GOOD-YEAR	0.0750	0.2003	0.0319	-0.1489	0.5203
24 GORBON İSİL	0.0546	0.2632	0.0360	-0.4154	0.6250
25 GÜBRE FABRİKALARI	-0.0012	0.1802	-0.0192	-0.2703	0.2941
26 GÜNEY BİRACILIK	0.0634	0.1820	0.0477	-0.2444	0.3623
27 HEKTAS	0.0174	0.2274	-0.0139	-0.3371	0.4591
28 İKTİSAT FİN.KİR	0.0324	0.1224	0.0445	-0.1667	0.2000
29 İZMİR DEMİR ÇELİK	-0.0521	0.1410	-0.0667	-0.2432	0.2333
30 İZOCAM	0.0203	0.1560	0.0346	-0.2957	0.2963
31 KARTONSAN	-0.0128	0.1539	0.0000	-0.3438	0.2500
32 KAV	-0.0124	0.2491	-0.0208	-0.3591	0.3989
33 KEPEZ ELEKTRİK	0.0604	0.3426	-0.0368	-0.3641	1.0370
34 KOC HOLDING	0.0048	0.2097	-0.0169	-0.3008	0.4146
35 KOC YATIRIM	0.0116	0.1802	-0.0428	-0.1948	0.3396
36 KORDSA	-0.0554	0.1156	-0.0753	-0.1973	0.1799
37 KORUMA TARIM	-0.0565	0.1742	-0.0413	-0.4200	0.1667
38 KOYTAS	-0.0300	0.2721	-0.0250	-0.5581	0.3889
39 MAKİNA TAKİM	-0.0347	0.2693	-0.0748	-0.4107	0.5135
40 MARET	-0.0095	0.1917	0.0424	-0.3333	0.3704
41 MARMARIS MARTI	-0.0013	0.1542	-0.0243	-0.1940	0.2889
42 MENSUCAT SANTRAL	-0.0576	0.1553	-0.0607	-0.2800	0.2778
43 METAS	0.0268	0.1841	-0.0172	-0.2333	0.3636
44 NASAS	0.0224	0.2499	0.0224	-0.3462	0.5882
45 NET HOLDING	-0.0173	0.1067	-0.0192	-0.2333	0.1739
46 OKAN TEKS	-0.0493	0.1232	-0.0680	-0.2051	0.2381
47 OLMUKSA	0.0262	0.2050	-0.0394	-0.2000	0.5000
48 OTOSAN	0.0618	0.2618	-0.0221	-0.3035	0.6772
49 PEG PROFİLO	-0.0458	0.1858	-0.0631	-0.3900	0.2553
50 PINAR ET	0.0236	0.2667	-0.0845	-0.2581	0.4783
51 PINAR SU	-0.0238	0.1861	-0.0462	-0.3571	0.3077
52 PINAR SUT	0.0449	0.2279	0.0717	-0.2927	0.5185
53 PINAR UN	-0.0069	0.2473	-0.0099	-0.5694	0.3111
54 PIMAS	0.0513	0.2387	0.0489	-0.4412	0.4789
55 POLYLEN	-0.0071	0.3018	-0.0392	-0.3864	0.6296
56 RABAK	-0.0852	0.1906	-0.0908	-0.4286	0.2000
57 SANTRAL HOLD.	-0.0902	0.1641	-0.0427	-0.3750	0.1250
58 SARKUYSAN	0.0020	0.2045	-0.0195	-0.3600	0.5068
59 SIFAS	-0.1141	0.2580	-0.1338	-0.5686	0.3636
60 TELETAS	-0.0139	0.2626	-0.0602	-0.3379	0.5365
61 T.DEMİR DOKUM	0.0371	0.2375	0.0255	-0.3283	0.5769
62 T.İS BANKASI(B)	-0.0076	0.2041	-0.0472	-0.2857	0.3542
63 T.İS BANKASI(C)	-0.0189	0.1598	-0.0270	-0.2703	0.3548
64 T.SIEMENS	0.0623	0.2741	0.0184	-0.3019	0.7500
65 T.SİSE CAM	-0.0488	0.1762	-0.0541	-0.2903	0.3636
66 TSKB	-0.0046	0.1023	0.0128	-0.2388	0.1471
67 YASAS	0.0423	0.2931	-0.0208	-0.3385	0.5476

APPENDIX 1C

SUMMARY STATISTICS ABOUT β ESTIMATION

1990

	β	t-ratio	constant(α)	t-ratio	F Value	R ²
1 AKCIMENTO	1.357	4.128	-0.008	-0.129	39.044	0.437
2 ANADOLU CAM	1.054	8.345	0.006	0.241	91.640	0.760
3 ARCELİK	0.981	6.751	0.026	0.978	67.581	0.674
4 BAGFAS	1.005	4.107	0.013	0.298	38.865	0.434
5 BOLU CIM	0.962	5.484	0.029	0.889	52.076	0.578
6 BRISA	0.798	4.761	-0.007	-0.236	44.665	0.507
7 CELİK HALAT	0.872	10.665	-0.013	-0.896	135.748	0.838
8 CİMSA	1.334	5.916	-0.006	-0.148	56.997	0.614
9 CUKUROVA	0.982	6.808	0.012	0.448	68.343	0.678
10 DOKTAS	1.182	6.908	-0.025	-0.783	69.724	0.684
11 ECZ. YAT	1.615	11.053	0.019	0.725	144.159	0.847
12 EGE BİRA	1.232	7.474	0.061	1.998	77.864	0.717
13 EGE GÜB	0.966	4.753	-0.042	-1.129	44.589	0.507
14 EREGLİ D. CELİK	1.480	7.118	0.091	2.394	72.671	0.697
15 GOOD YEAR	1.693	5.521	-0.028	-0.495	52.477	0.581
16 GÜBRE FAB	0.373	2.085	-0.067	-2.038	26.349	0.165
17 GÜNEY BİRA	1.181	6.315	0.010	0.283	61.874	0.644
18 HEKTAS	0.833	4.394	0.017	0.487	41.309	0.467
19 İZMİR DEM. CEL.	1.032	7.553	-0.057	-2.278	79.043	0.722
20 İZOCAM	0.982	5.201	0.017	0.494	49.050	0.551
21 KARTONSAN	0.811	4.678	-0.003	-0.092	43.886	0.499
22 KAV	0.987	6.786	0.017	0.618	68.054	0.677
23 KEPEZ ELEK	0.844	5.864	0.000	0.007	56.388	0.610
24 KOC HOLD	1.221	10.956	-0.001	-0.025	142.026	0.845
25 KOC YAT	0.952	10.811	-0.004	-0.265	138.888	0.842
26 KORDSA	0.772	5.890	-0.003	-0.115	56.695	0.612
27 KORUMA TARIM	0.722	3.390	0.034	0.874	33.493	0.343
28 MAKİNA TAKİM	1.662	6.126	-0.011	-0.228	59.524	0.630
29 METAS	0.747	3.751	-0.041	-1.126	36.069	0.390
30 NASAS	1.029	3.130	-0.038	-0.630	31.795	0.308
31 OLMUKSA	1.320	7.936	-0.028	-0.904	84.983	0.741
32 OTOSAN	1.074	11.008	0.006	0.322	143.180	0.846
33 PINAR SUT	0.827	5.794	0.009	0.341	55.570	0.604
34 PİMAS	0.727	2.312	0.006	0.107	27.344	0.195
35 SARKUYSAN	1.139	7.330	0.023	0.820	75.733	0.710
36 T. DEMİRDOKUM	1.044	11.612	-0.031	-1.892	156.832	0.860
37 T. İS (B)	1.110	6.475	-0.014	-0.449	63.932	0.656
38 T İS (C) (75 BDZ)	0.328	1.751	-0.005	-0.145	25.066	0.122
39 T. SIEMENS	1.516	7.562	-0.036	-0.986	79.181	0.722
40 T. SİSE CAM	0.933	4.604	0.032	0.861	43.198	0.491
41 YASAS	0.989	5.817	0.014	0.456	55.832	0.606

APPENDIX 2A

SUMMARY STATISTICS ABOUT β ESTIMATION

1991

	β	t-ratio	constant(α)	t-ratio	F Value	R ²
1 AKCIMENTO	1.017	6.692	-0.031	-0.876	45.550	0.674
2 ANADOLU CAM	0.908	7.629	-0.016	-0.592	59.196	0.729
3 ARCELİK	0.709	4.455	0.026	0.713	20.180	0.478
4 BAGFAS	0.908	5.844	-0.007	-0.201	34.733	0.612
5 BOLU CIM	0.855	4.619	0.018	0.426	21.701	0.497
6 BRISA	0.849	6.899	-0.037	-1.306	48.410	0.688
7 ÇELİK HALAT	0.979	9.098	-0.039	-1.577	84.175	0.793
8 CİMSA	0.933	5.987	-0.025	-0.689	36.455	0.624
9 ÇUKUROVA	0.954	8.997	-0.027	-1.098	82.315	0.789
10 DOKTAS	0.850	5.551	-0.014	-0.405	31.343	0.588
11 ECZ. YAT	1.024	2.721	0.084	0.967	7.531	0.255
12 EGE GÜB	1.227	6.100	-0.060	-1.278	37.837	0.632
13 EREĞLİ D. ÇELİK	2.300	8.043	-0.014	-0.216	65.794	0.749
14 GOOD YEAR	1.480	5.337	-0.083	-1.299	28.966	0.568
15 GÜBRE FAB	0.851	3.946	-0.068	-1.372	15.834	0.419
16 GÜNEY BİRA	0.905	5.267	-0.005	-0.128	28.212	0.562
17 HEKTAS	0.811	5.333	-0.009	-0.265	28.925	0.568
18 İZMİR DEM. ÇEL.	0.913	7.172	-0.077	-2.626	52.315	0.704
19 İZOCAM	0.929	6.409	-0.015	-0.452	41.779	0.655
20 KARTONSAN	0.791	4.991	-0.009	-0.234	25.329	0.535
21 KAV	0.926	6.868	-0.039	-1.237	47.974	0.686
22 KEPEZ ELEK	1.362	5.926	-0.030	-0.566	35.709	0.619
23 KOC HOLD	1.109	3.472	0.057	0.765	12.263	0.358
24 KOC YAT	0.782	6.688	0.027	1.013	45.485	0.674
25 KORDSA	0.707	7.017	-0.033	-1.398	50.081	0.695
26 KORUMA TARIM	0.879	4.665	-0.048	-1.105	22.131	0.501
27 KOYTAS	0.645	2.171	0.042	0.605	4.795	0.179
28 MAKİNA TAKİM	1.280	5.060	0.018	0.305	26.043	0.542
29 MARET	0.628	3.254	0.011	0.240	10.768	0.329
30 MENSUCAT SANTRAL	0.702	4.233	-0.027	-0.714	18.224	0.453
31 METAS	1.345	5.247	-0.070	-1.182	27.997	0.560
32 NASAS	1.893	4.778	-0.069	-0.758	23.221	0.514
33 OLMUKSA	1.057	6.550	-0.048	-1.296	43.634	0.665
34 OTOSAN	0.976	6.677	-0.021	-0.633	45.343	0.673
35 PINAR SUT	0.902	7.418	-0.032	-1.135	55.963	0.718
36 PİMAS	0.769	2.516	0.001	0.019	6.436	0.226
37 RABAK	1.597	4.339	-0.074	-0.864	19.144	0.465
38 SARKUYSAN	0.807	4.813	0.019	0.496	23.560	0.517
39 TELETAS	1.139	5.832	-0.070	-1.558	34.591	0.611
40 T. DEMİRDOKUM	1.146	10.212	-0.040	-1.552	106.065	0.828
41 T. İS (B)	0.935	4.603	0.040	0.858	21.547	0.495
42 T. SIEMENS	1.341	6.295	-0.040	-0.821	40.303	0.647
43 T. SİSE CAM	1.491	5.945	0.032	0.551	35.941	0.620
44 YAPI KREDİ	1.921	4.111	-0.047	-0.435	17.191	0.439
45 YASAS	1.043	6.827	-0.013	-0.380	47.395	0.683
46 DEVA HOLD	1.170	3.096	0.063	0.722	9.748	0.307
47 PINAR ET	0.457	2.021	-0.016	-0.307	4.135	0.155
48 MARMARİS ALTIN	0.790	3.628	-0.044	-0.882	13.386	0.378
49 PINAR SU	0.860	6.043	-0.058	-1.764	37.135	0.628

APPENDIX 2B

SUMMARY STATISTICS ABOUT β ESTIMATION

1992

1992	β	t-ratio	constant(α)	t-ratio	F Value	R ²
1 AKAL TEKSTIL	0.977	4.430	-0.024	-0.557	19.481	0.470
2 AKCIMENTO	0.990	9.419	-0.008	-0.384	88.055	0.800
3 AKSA	0.693	1.803	0.039	0.508	3.225	0.128
4 ALARKO HOLDING	0.908	3.019	0.077	1.289	9.048	0.291
5 ANADOLU CAM	0.849	9.767	-0.082	-4.735	94.675	0.811
6 ARCELİK	0.800	4.676	0.037	1.100	21.704	0.497
7 AYGAZ	0.631	1.794	0.099	1.413	3.194	0.127
8 BAGFAS	0.963	6.535	-0.024	-0.809	42.389	0.658
9 BOLU CIMENTO	1.076	4.983	-0.003	-0.077	24.647	0.528
10 BRISA	0.856	10.317	-0.051	-3.091	105.641	0.828
11 CANAKKALE CIMENTO	1.352	3.061	0.116	1.316	9.298	0.297
12 CELİK HALAT	1.125	7.650	-0.037	-1.276	58.088	0.725
13 CİMSA	0.871	6.846	-0.012	-0.476	46.519	0.679
14 CUKUROVA ELEKTRİK	0.967	6.362	-0.029	-0.963	40.166	0.646
15 DEVA	1.179	6.298	0.011	0.302	39.366	0.641
16 DOĞUSAN	0.720	3.287	-0.048	-1.100	10.723	0.328
17 DOKTAS	1.157	4.060	0.043	0.752	16.361	0.427
18 ECZ. YATIRIM	0.887	2.238	0.081	1.025	4.971	0.184
19 EGE ENDÜSTRİ	1.435	6.710	0.031	0.737	44.678	0.670
20 EGE GÜBRE	1.187	6.626	-0.044	-1.234	43.578	0.665
21 ERÇİYES BİRACILIK	1.298	6.058	0.074	1.731	36.417	0.623
22 EREĞLİ DEMİR ÇELİK	2.111	6.422	0.024	0.373	40.928	0.650
23 GOOD YEAR	1.056	3.991	0.008	0.144	15.805	0.418
24 GORBON İSİL	4.457	5.386	0.091	0.555	28.789	0.567
25 GÜBRE FABRİKALARI	1.197	8.121	-0.045	-1.540	65.449	0.748
26 GÜNEY BİRACILIK	0.890	4.644	0.037	0.956	21.400	0.493
27 HEKTAS	0.966	9.102	-0.047	-2.203	82.228	0.789
28 İKTİSAT FİN. KİR.	0.243	1.512	0.153	2.419	0.200	0.073
29 İZMİR DEMİR ÇELİK	1.203	4.336	-0.026	-0.475	18.661	0.459
30 İZOCAM	1.044	6.296	0.035	1.067	39.341	0.641
31 KARTONSAN	0.717	7.416	-0.032	-1.668	54.576	0.713
32 KAV	0.934	5.150	-0.031	-0.848	26.321	0.545
33 KEPEZ ELEKTRİK	1.460	6.404	-0.007	-0.153	40.701	0.649
34 KOC HOLDING	1.056	3.254	0.067	1.037	10.511	0.323
35 KOC YATIRIM	0.817	4.945	0.038	1.162	24.273	0.525
36 KORDSA	0.663	6.862	-0.030	-1.554	46.734	0.680
37 KORUMA TARIM	0.974	6.249	-0.040	-1.300	38.757	0.638
38 KOYTAS	0.826	3.422	0.018	0.381	11.621	0.346
39 MAKİNA TAKİM	0.849	3.869	-0.032	-0.739	14.856	0.403
40 MARET	0.863	4.104	0.003	0.073	16.717	0.432
41 MARMARİS MARTİ	0.371	1.921	-0.042	-1.080	3.662	0.143
42 MENSUCAT SANTRAL	0.847	3.793	-0.029	-0.651	14.282	0.394
43 METAS	1.835	5.689	0.001	0.011	32.120	0.593
44 NASAS	1.959	5.974	-0.044	-0.678	35.423	0.617
45 NET HOLDING	0.787	4.694	-0.055	-1.642	21.864	0.498
46 OKAN TEKSTİL	0.473	2.792	-0.033	-0.976	7.737	0.260
47 OLMUKSA	0.668	6.291	-0.072	-3.393	39.274	0.641
48 OTOSAN	1.107	4.666	0.015	0.324	21.609	0.496
49 PEG PROFILO	0.481	2.709	-0.006	-0.162	7.281	0.249
50 PINAR ET	0.787	4.952	-0.028	-0.870	24.338	0.525
51 PINAR SU	1.027	7.393	-0.036	-1.297	54.241	0.711
52 PINAR SUT	0.790	4.939	-0.053	-1.652	24.208	0.524
53 PINAR UN	0.814	3.437	-0.017	-0.366	11.722	0.348
54 PİMAS	1.040	4.661	-0.030	-0.683	21.559	0.495
55 POLYLEN	0.568	2.682	-0.040	-0.948	7.141	0.245
56 RABAK	0.906	5.772	-0.061	-1.942	33.069	0.600
57 SANTRAL HOLDING	1.256	6.954	0.002	0.057	47.989	0.686
58 SARKUYSAN	0.917	5.589	0.002	0.068	31.005	0.585
59 SİFAS	0.731	3.645	-0.005	-0.120	13.183	0.375
60 TELETAS	1.006	6.947	0.008	0.268	47.893	0.685
61 T. DEMİRDOKUM	1.274	6.366	0.018	0.449	40.221	0.646
62 T. İS BANKASI(B)	1.021	5.314	-0.009	-0.236	28.025	0.560
63 T. İS BANKASI(C)	1.180	5.047	0.015	0.316	25.284	0.535
64 T. SIEMENS	0.996	5.679	-0.009	-0.267	32.004	0.593
65 T. SİSE CAM	1.555	5.328	0.023	0.400	28.171	0.561
66 TSKB	1.003	8.692	-0.060	-2.621	74.976	0.773
67 YASAS	0.938	8.110	-0.053	-2.313	65.278	0.748

APPENDIX 2C

CROSS-SECTIONAL REGRESSIONS STATISTICS

		$\gamma(\beta)$	t stat	$\gamma(E/P)$	t stat	$\gamma(MV)$	t stat	R ²
	1	-0.2776	-1.05	-1.4630	-1.06	0.1536	3.44	25.1%
	2	0.0008	0.01	0.6341	1.02	-0.0104	-0.52	3.0%
	3	0.0685	0.84	-0.0462	-0.11	-0.0201	-1.46	6.9%
	4	0.1404	1.89	0.1227	0.32	0.0034	0.27	10.4%
	5	-0.1801	-1.88	-1.2520	-2.51	-0.0078	-0.48	25.1%
1990	6	0.0424	0.61	0.1011	0.28	0.0818	0.70	3.5%
	7	0.3233	1.27	1.9000	1.43	-0.0011	-0.02	9.9%
	8	-0.0132	-0.20	-0.1400	-0.41	0.0168	1.52	6.1%
	9	0.0126	0.15	0.3606	0.81	0.0191	1.32	8.5%
	10	-0.0201	-0.38	0.5995	2.18	0.0098	1.10	17.7%
	11	-0.0271	-0.55	0.0523	0.20	-0.0145	-1.75	9.8%
	12	-0.0542	-1.00	-0.1538	-0.54	-0.0009	-0.10	3.9%
	1	-0.0749	-0.53	-0.4910	-2.02	-0.0232	-0.83	11.3%
	2	-0.1174	-1.17	0.1405	0.82	-0.0097	-0.49	6.5%
	3	-0.0676	-1.23	-0.0676	-0.72	-0.0149	-1.38	11.1%
	4	-0.0351	-0.11	-0.0089	-0.16	0.0080	1.27	3.7%
	5	-0.0284	-0.42	0.0226	0.20	-0.0155	-1.17	4.5%
1991	6	-0.0114	-0.34	-0.0599	1.43	0.0249	0.07	5.1%
	7	-0.0169	-0.17	0.1226	-0.52	0.0007	1.89	7.9%
	8	0.0934	1.40	0.0114	0.10	0.0243	1.86	15.1%
	9	-0.0515	-1.22	-0.0055	-0.08	-0.0243	-0.29	4.3%
	10	-0.0623	-1.05	0.1144	1.12	-0.0159	-1.37	11.2%
	11	-0.0306	-0.23	-0.1389	-0.62	0.0207	0.80	2.0%
	12	0.0436	0.78	0.1628	1.72	-0.0255	-2.34	14.1%
	1	0.0509	1.35	-0.0805	-1.51	-0.0027	-2.22	12.6%
	2	-0.0447	-1.75	-0.0232	-0.64	0.0060	0.73	5.5%
	3	0.0252	0.90	0.0859	2.16	0.0010	0.11	7.8%
	4	0.0034	0.08	0.0054	0.09	-0.0101	-0.74	0.9%
	5	0.0288	1.19	0.0611	1.79	0.0107	1.38	9.7%
1992	6	0.0219	0.42	0.0766	1.04	0.0159	0.95	3.5%
	7	-0.0032	-0.08	-0.0242	-0.43	0.0014	0.11	0.3%
	8	0.0459	1.28	0.0615	1.21	-0.0007	-0.06	4.4%
	9	0.0166	0.39	-0.1515	-2.52	-0.0046	-0.34	9.8%
	10	0.0581	2.06	-0.0346	-0.87	-0.0126	-1.38	9.7%
	11	-0.0108	-0.49	0.0595	1.89	-0.0036	-0.50	6.2%
	12	0.0222	0.58	0.0427	0.78	0.0118	0.95	3.0%

APPENDIX 3